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China Tries to Clean Up Toxic Legacy of Its Rare Earth Riches

By KEITH BRADSHER

TIJANJIN, China — In northern China, near the Mongolian border, radioactively contaminated leaks from two decades of rare earth refining have been slowly trickling underground toward the Yellow River, a crucial water source for 150 million people.

In Jiangxi province in south-central China, the national government has seized control of rare earth mining districts from provincial officials after finding widespread illegal strip-mining of rare earth metals.

And in Guangdong province in southeastern China, regulators are struggling to repair rice fields and streams destroyed by powerful acids and other runoff from open-pit rare earth mines that are often run by violent organized crime syndicates.

Communities scattered across China face heavy environmental damage that accumulated through two decades of nearly unregulated rare earth mining and refining. While the Chinese government has begun spending billions of dollars to clean up the damage, the environmental impact is becoming an international trade issue, with a World Trade Organization panel in Geneva expected to issue a crucial draft report on Wednesday.

Arriving three years after an international tempest over the rare earths trade and 19 months after the World Trade Organization litigation was actually filed, the coming decision may not make a big difference to the rare earth industry itself, industry executives and officials said. But the case does seem to have had the unintended effect of helping to goad China into a major environmental cleanup.

China, the world's dominant producer of rare earth metals, quietly and unilaterally imposed taxes and annual tonnage limits on its rare earth exports seven years ago. It then gradually raised the taxes and lowered the tonnage limits in subsequent years, slowly throttling supplies to overseas manufacturers.

China contends that these export restrictions are needed to protect its environment. The United States, the European Union and Japan have challenged China's taxes and quotas at the World Trade Organization. They note that China has done little to limit rare earth consumption within its borders.

The rare earth case "will be a landmark case in terms of both export restrictions and the environment," said James Bacchus, the former two-term chairman of the W.T.O. appeals tribunal in Geneva.

China has made ample supplies available to manufacturers within China that produce crucial components for a host of products like laptop computers, compact fluorescent bulbs, wind turbines and electric cars. Some Western and Japanese companies have moved factories to China to make sure that they have access to rare earths.

The W.T.O. panel faces some of the trickiest issues in international trade. Environmentalists have been wary of the trade organization ever since its predecessor, the General Agreement

on Tariffs and Trade, rejected an American ban in the early 1990s on the import of tuna caught in ways that are hazardous to dolphins.

The Chinese export restrictions have become less important over the last several years for two reasons. Alternative rare earth mines have gone into production in the United States and Australia, reducing China's share of global production to 85 percent, from 95 percent three years ago. And companies have become much more efficient about economizing on rare earths, especially the costliest ones, the so-called heavy rare earths like dysprosium.

The change is visible in the supply warehouse here of one of the world's few factories producing rare earth powders for use in very powerful magnets. Whether in smartphones or missiles, the most advanced applications for rare earths tend to involve the manufacture of miniature but crucial components using the powerful magnetic qualities of rare earths.

The rare earth complex here in Tianjin is owned by Molycorp, an American company, although the factory buys its processed rare earths almost entirely from Chinese refineries. The warehouse has neatly arranged stacks of barrels of rare earths. The bright blue barrels holding neodymium, another highly magnetic rare earth, are only two feet high and a little more than a foot in diameter, but weigh more than 550 pounds because of the material's extraordinary density.

Sitting by itself on a wooden pallet is a single gray can of dysprosium, a rare earth that sells for \$243 per pound. Dysprosium prices soared as high as \$1,135 per pound two years ago in a speculative bubble that followed China's imposition of an unannounced embargo on rare earth shipments to Japan from September to November 2010, during a territorial dispute.

That spike in prices has prompted companies to economize in use of rare earths. Molycorp now mixes half as much dysprosium into its magnetic powders as it did even a year ago. Many of its customers have decided that their magnets do not need dysprosium, which is added in trace quantities to help rare earth magnets retain their magnetism at temperatures above the boiling point of water.

"People in Sichuan think they would die without their chili peppers, but they can live without them," said Chen Kerong, the production director at the Molycorp factory here. "People love dysprosium, but they can live without it, too."

The global oil industry has similarly begun using less lanthanum, another rare earth, during oil refining. Only 1.5 percent of the latest catalyst formulations for oil refining are now lanthanum, down from 4 or 5 percent three years ago.

But the case before the World Trade Organization appears to have made a difference already by prompting a broad environmental cleanup. In a white paper issued in June last year, China's cabinet described at length the environmental harm caused by the rare earth industry, an admission that although embarrassing for Beijing may have buttressed its case at the W.T.O. that the rare earth industry is a dirty business for which export restrictions are justified. "Excessive rare earth mining has resulted in landslides, clogged rivers, environmental pollution emergencies and even major accidents and disasters, causing great damage to people's safety and health and the ecological environment," the white paper said.

Chinese officials have repeatedly denied that their newfound concerns for the environmental consequences of rare earth mining and refining are driven by a desire to help avoid defeat at the W.T.O., although the cleanup could help on that.

Whole villages between the city of Baotou and the Yellow River in Inner Mongolia have been evacuated and resettled to apartment towers elsewhere after reports of high cancer rates and other health problems associated with the numerous rare earth refineries there.

The most hazardous refineries are those that crack the tight chemical bonds that tie rare earths found in mineral ores to a variety of hazardous materials, notably radioactive thorium. Many tons of extremely concentrated sulfuric acid are used to break the chemical bonds. Then the valuable rare earth metals, which are not radioactive themselves, can be purified. But a hazardous stew of toxic chemicals and low-level radioactive waste is left behind. Most of that waste has been dumped into the world's largest mine tailings pond, which covers four square miles near the Yellow River on the western outskirts of Baotou.

Built in the 1950s under Mao Zedong, the tailings pond lacks a liner to prevent the leaking of radioactive waste and toxins into the groundwater, where they have been gradually seeping toward the Yellow River. There is no evidence that the waste and toxins have reached the river, but the Chinese government plans to spend hundreds of millions of dollars pumping out as much contaminated groundwater as possible and pumping enormous quantities of fresh water into the earth to dilute what is left before it reaches the Yellow River.

On orders from Beijing, state-controlled enterprises have dismantled Baotou refineries and rebuilt them at an enormous mining complex at Bayan Obo in the Gobi Desert, which mines about half the world's rare earths. Chinese state-controlled media have reported that tens of thousands of goats and other livestock there have died and many baby goats have been born severely deformed, possibly because of radioactive contamination from the rare earth industry.

Located in an arid area nearly uninhabited except for mine workers, the refineries have been rebuilt there with extensive wastewater treatment facilities, according to industry officials in Beijing.

The W.T.O. panel will send its confidential draft report on Wednesday to China and the countries that brought the case, which will then be allowed to suggest changes before the final decision is made on Nov. 21.

Whoever loses the decision is likely to appeal to the trade organization's appellate body — two-thirds of decisions are appealed, and sometimes even winners have appealed to obtain better-worded verdicts. Each party has six weeks to decide whether to appeal after the decision is published in mid-December, and then the appellate body has another three months to rule.

The betting in most of the rare earth industry and among international trade lawyers is that China will lose the W.T.O. case and will comply by removing its export quotas and export duties. But these changes may not make a big difference, because China has spent the past few years forcing mergers so that 99 percent of the country's legally mined rare earths are produced by just 10 companies, all with varying degrees of state control.

But if they push prices up too quickly, they could face competition from Molybdenum, which has reopened a mine in the California desert, and from Lynas of Australia, which mines rare earths in Western Australia and refines and processes them in Malaysia.

Market forces may have more of an effect on China's ability to control the market in the coming years than export restrictions, said Dudley Kingnorth, a former rare earths mining

executive who is now a business professor and the director of the Critical Materials Initiative at Curtin University in Perth, Australia.

“If it were decided five years ago,” he said, “it might have had an impact.”

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Oil Companies Are Sued for Waste of Natural Gas

By CLIFFORD KRAUSS

HOUSTON — In the sharpest challenge yet to the surge in flaring of natural gas in the Bakken shale oil field, North Dakota mineral owners this week filed 10 class-action lawsuits seeking millions of dollars in lost royalties from some of the nation's largest oil companies.

Roughly 1,500 fires burn above western North Dakota because of the deliberate burning of natural gas by companies rushing to drill for oil without having sufficient pipelines to transport their production. With cheap gas bubbling to the top with expensive oil, the companies do not have an economic incentive to build the necessary gas pipelines, so they flare the excess gas instead.

Flaring is environmentally less harmful than releasing raw natural gas into the atmosphere, but the flared gas still spews climate-warming carbon dioxide into the atmosphere. The quantities of gas burned are so large that the fires rising above wheat and sunflower fields look like a small city in NASA photographs taken from satellites.

Flared gas has nearly tripled in the last two years in North Dakota, with almost 30 percent of the output in the state burned at wells, producing emissions equivalent to more than two medium-size coal-fired power plants.

The value of flared gas in the state is roughly \$100 million a month, leading property owners who lease their lands to the oil companies to believe they are losing money even though they are earning increasing royalties from the fast expansion of oil production in North Dakota. Oil output has risen by 100,000 barrels a day since May alone.

“The lawsuits seek to force operators to comply with state law and pay royalties to mineral owners on the value of flared gas,” according to a statement released on Wednesday by one of five law firms that filed the suits, “and by so doing create a compelling economic incentive for producers to reduce and eliminate the wasteful practice of flaring.”

Companies being sued include Continental Resources, XTO Energy, SM Energy and Marathon Oil.

North Dakota regulators allow companies to seek exemptions for flaring as they connect their wells to gas-gathering lines. But the suits accuse the companies of violating deadlines and other limitations.

Oil companies and their local trade association say they are working as fast as possible to build pipelines, and they note that the companies now flare about 29 percent of the gas they produce, compared to 36 percent in September 2011.

Companies belonging to the North Dakota Petroleum Council announced the formation this week of a task force to increase efforts to reduce flaring. The group is expected to present a report by the end of the year.